Modelling Sustainable Systems and Semantic Web

Digital Action Space

Lecture in the Module 10-202-2312
for Master Computer Science

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Summary

We introduced so far several central notions.

System as an essential structural form of delimitation and containment both in reality (from biological cells to social forms such as companies as economically delimited action spaces or states as politically and legally delimited action spaces – interestingly, this does not continue to the quantum level) and structures of delimitation and reduction of complexity in cooperative thinking actions.

Summary

Systemic structures as a set of interdependent open systems whose throughputs of energy, substance and information are mutually dependent, without the interrelationships already being understood as an overall system.

Special case: Short scale internal rhythms of the systems, long scale rhythms of the throughput relationships. Then the dynamics of evolution at both system levels can often still be analysed with advanced mathematical methods (interlacing of micro- and macroevolution), whereby new cooperative phenomena emerge.

For more details on systemic structures:

- Russell L. Ackoff (1971). Towards a system of systems concept. Management Science 17 (11), 661-671.

Summary

Shchedrovitsky describes the genesis of such an overall system as a **schematisation** as follows:

- **Analysis:** Structural decomposition of the overall system into its parts, (recursive) schematisation of the parts.
- **Synthesis:** Combining the descriptions of the parts and their interactions, reduced to essentials, into a description of the overall system that is oriented towards a **specific objective** and thus a **specific contextualisation**.
- **Evaluation:** Does this description prove its value in the feedback cycle with the practice?
  Iterative continuation on the basis of the modification of the objective of the mental process.

In view of the specificity of software as a thought artefact, such approaches also play a central role in Software Engineering in Component Software (module, integration and system level).

Summary

In this process, both structural and operational approaches are important.

- **Analysis** focuses on delimitation and decomposition. Structural approaches and a spatial metaphor are in the foreground.
- However, the system is only operable in assembled state. **Synthesis** is directed towards relational structures. Operational approaches as complexity reduction and relational metaphors are in the foreground.

Action Spaces: This term breaks down these systemic structuring processes to social systems with specific attention to the actors involved as **subjects**.

What is Data?

The last question in the last lecture was about data.

- Data as a specific form of description.
- Capturing data always means choosing what *not* to capture.
- Hence capturing data is subjective *from the position of a subject*.
- Data as a link between world and reality.
- But what then is *objective* data?
  - Specific reflex of a positivistic understanding of science.
  - Use and misuse: Such an understanding (of science) is an important cultural achievement of humankind, which, however, also has to be *contextualised in concrete-historical terms*.
- Data is also a form of cooperative practices of people as subjects.

Digital Transformation

Concept of the **Digital Universe** as a rather technically shaped inner-societal space of action through the processing of digital data, with a vague demarcation. Picking up a common buzz word.

- "By 2020, the digital universe will amount to 44 trillion gigabytes" (EMC Digital Universe with Research & Analysis by IDC. The Digital Universe of Opportunities: Rich Data and the Increasing Value of the Internet of Things. April 2014).
- Reference to the central thesis – a spatial metaphor is used to analyse the digital transformation from a specific dichotomy.

Central Thesis:

The digital transformation is characterised by a rapidly growing "world of digital data", through the analysis and processing of which influence is exerted on real-world processes.

Digital Transformation

On the Critique of this Approach

- In this version, we want to focus on questions of how current structuring processes in the digital universe and real-world processes interact and influence each other.
- The concept of juxtaposing "real-world" and "digital" reality is problematic overall, since actions in the digital universe are both motivated by real-world practices and have an influence on real-world practices.
- However, the concept emphasises that many real-world contexts of action interact with technical processes in this space and therefore such an abstraction seems reasonable.

Digital Transformation

The Digital Knowledge Revolution

Michael Schetsche: "The digital knowledge revolution" (2006, in German) identifies six social and cultural dimensions:

- a new order of knowledge,
- social control through technical norms,
- the automatic archive function of the net,
- the supplementation of the exchange economy by a gift economy,
- the abolition of the guiding difference between "public" and "private",
- the dialectic of possibility and obligation of permanent communication.

Digital Transformation

All in all, it makes sense and is necessary to speak of a *transformed social order* in which the *structurally decisive changes* emanate from the digital networks.

A more precise understanding of the change in particular in the order of knowledge is an essential part of an analysis of the digital transformation.

Problem: For the new phenomena, we (initially) only have the old terms.

I will not elaborate on that here and refer to (Schetsche 2006).

Digital Action Spaces

How and where are you acting
in the digital universe?

What opportunities for your own
and collective action in the digital universe
do you frequently use?

Which preconditions
must be fulfilled for this?

Digital Action Spaces. From earlier Discussions

- The digital universe breaks down into different universes – the Instagram universe, the Facebook universe, the Google Scholar universe, the Wikipedia universe, the Search universe etc.
  - Space in space metapher. Such „subspaces“ are constituted by specific kinds of social relations and specific social practices.
- What to do there?
  - Upload pictures and data.
  - Like and be liked.
  - Communcate with friends in Corona times.
  - Online appointment for offline meeting.
  - Present oneself in digital spaces.
  - Searching for useful information.

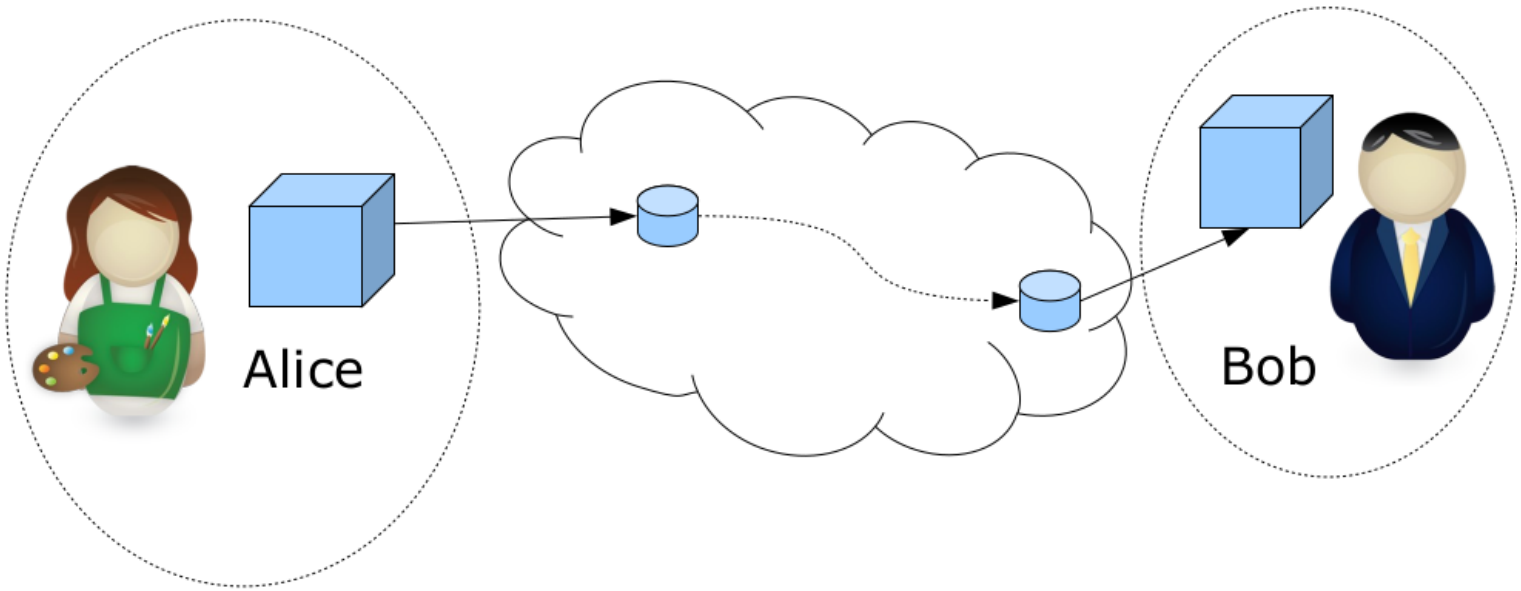
Digital Action Spaces. Accounts

- Diversity of accounts = diversity of digital identities
  - Identity in the singular or in the plural?
  - My Core – world and reality, meaningful terms?
  - Diversity of identities or of real-world facets
- *Identity* as an important concept in the civil legal system, which is also legally attached in order to be able to assign consequences of actions.
- Questions of private digital spaces of action can only be meaningfully discussed if the user is "logged in" to a computer via an **account**.
  This also applies to other (e.g. mobile) devices, although the technical connection to an account (via SIM card and own security settings) is less visible there.

Using Digital Action Spaces. Digital Identity

- Such an account is associated with a **digital identity** to which actions on the internet are assigned, via which the usual legal-social constructs of the *legal attributability of actions* are transferred to the digital sphere.
  - The private attribution of consequences of action is a *pillar of the civil legal order*.
  - The technical possibilities in the digital universe can *improve* or *complicate* the attributability of legal responsibility.
  - Possibility of *anonymous action*. But: traces of actions are fundamentally accessible to forensic analysis. This also applies to actions on the internet.

Real-world and Digital Identities



For actions in the digital universe, real-world identities must be tied to digital identities.

Real-world and Digital Identities

- The assignment of a digital identity to a real person takes place via **authentication**, which appears to be a *private* act (albeit technically preconditioned).
  - However, it presupposes an **authenticator** as the technical counterpart and thus a higher-level legal context. This assignment process is nevertheless postulated as private in the public.
- Private digital spaces of action can only be shaped through the binding to a digital identity.
  - The rebinding of a digital identity to a civic legal subject is itself a socio-technically institutionalised process.
  - This rebinding is particularly simple if the signature of a technical artefact from the digital universe can be easily assigned to the civil legal subject.

Acting on the Internet

- Action spaces are socially determined. Digital action spaces can be and are constituted and assigned through **authorisation**.
- In shaping action spaces on the internet, subjects are highly dependent on technical services and thus on external institutions whose *trustworthiness* they must assess appropriately.
- Regulatory provisions for actions on the internet exist only in rudimentary form, so that *appropriate practical action* and *cooperative arrangements* on a *contractual basis* are the main forms of shaping a concept of "privacy on the internet".
- An *appropriate* understanding of the technical conditions, possibilities and restrictions of the internet is essential for the qualified shaping of personal actions on the internet.
- Social action constitutes the intersubjective relations of a subject.

On the Concept of Action Space

Thesis:

The concept of action space in the nowadays common sense is a cultural achievement of bourgeois civic society.

- Action spaces as a "space within space" structure and thus contextualise possibilities of cooperative arrangements in an "external space".
- *My* action spaces are identity-constituting, and the actions in these spaces form the basis for my personality as a civic legal subject.
- Only on this basis delimitations of other concepts such as *environment*, *acting in an environment*, *cooperative action* and thus ultimately concepts such as *subject*, *privacy* and *identity* can be meaningfully grasped.
- Collaborative action spaces can be condensed into "cooperative subjects" in the sense of the civil legal order.

Private Action and (Digital) Identity

Private action presupposes a *concept of self*, of personal *identity*.

- Digital identity, multiple digital identity and roles

  Is identity divisible?
- Abstract identity, textual representation

  Assignment mechanisms, e.g. website and login
- Authentication

  Password, other forms of authentication
- Authorisation

  Me as subject and as object of authorisation.
- Potential and real assignment. Notion of session.

Digital Identities

- Digital identity, abstract identity, textual representation
- Website, login, mobile devices
- Concept of session (not only on websites)
- Authentication and authorisation

Digital Identity

In the following, we understand *Digital Identity* as a **real-world civic subject** which is *authenticated* under a textual representation `<name@computername>` and *authorised* in the context of a session, that performs actions in the digital universe for a limited period of time.

The Concept of Roles in Computer Science

- In computer science, a role is a bundle of necessary *experience, knowledge and skills* that an employee must have in order to perform a certain *activity*.
- Roles are defined by *role descriptions* within a *role model*.
- A role is associated with *activities* and *responsibilities*.
- *Qualification characteristics* are required to perform a role.
- A person can have several roles. Several persons can have the same role.